

WARM-SEASON GRASSES IN PENNSYLVANIA

The warm-season grasses (WSG) commonly grown in Pennsylvania that will be discussed in this publication are switchgrass, big bluestem, little bluestem and indiangrass. Other WSG adapted to PA include eastern gamagrass, deertongue, sideoats grama, and coastal panicgrass.

Warm-season grasses usually take longer to establish than cool-season grasses (CSG) such as orchardgrass, timothy and smooth brome grass, but the stands have the potential to last much longer with less maintenance. There are multiple uses and benefits of warm-season grasses. The three primary uses are grazing, hay, and conservation cover, including critical areas.

There are secondary benefits of WSG for wildlife and these benefits vary based on the primary use. In a grazing program WSG provide spring ground nesting habitat. In a hay program, they provide spring ground nesting habitat and, if only one cutting is made at the proper time, they provide winter cover. As conservation cover they provide spring ground nesting habitat, summer forage, and winter cover.

ESTABLISHMENT

Site Conditions

Soil conditions and competition from weeds and CSG are the most important site conditions. Warm-season grasses are adapted to deep, moderately well-drained to well-drained soils, but can also be established on many of the shallow, droughty soils in Pennsylvania. Big bluestem and little bluestem are most tolerant of droughty soils (excessively drained), while switchgrass is the most tolerant of wetter soils (somewhat poorly drained).

Sites with severe weed problems or dense CSG sod should be avoided completely until these problems are under control. Cool-season grasses must be eliminated before establishing WSG. Row crop and small grain fields are ideal sites if severe weed problems are already under control.

Weed Control

Because WSG are slow to germinate and have less seedling vigor than CSG, weed/sod control -- both before and after planting -- is much more critical than when establishing CSG. Whether seeding after tillage or seeding no-till, severe weed problems and CSG must be treated before planting. The best strategy is to perform herbicide treatments the growing season before planting as well as at planting.

Because WSG are fairly resistant to atrazine, carryover following corn can be beneficial to warm season grass seedlings. If grasses have been controlled in a prior soybean crop, it will benefit warm season grass establishment. No-tilling into prior-year small grain stubble is a good option.

The most difficult situation for WSG establishment on farms is in existing pastures or hayfields. These CSG stands must be treated with a contact herbicide (glyphosate or paraquat) in the late summer/early fall before planting, and will usually require an additional herbicide treatment in the spring. Use Penn State Agronomy Guide recommendations and follow manufacturer label directions.

For establishing WSG, weed control throughout the growing season is just as critical as it is both before planting and at planting. It usually takes at least two growing seasons to establish a warm season grass stand which makes weed control during the first growing season critical. Because WSG are not shade tolerant, weed canopies will reduce seedling vigor. Moisture competition from weeds and CSG may also further reduce seedling vigor.

Herbicides such as 2,4-D, dicamba and Plateau® may be used to control broadleaf weeds. Use the Penn State Agronomy Guide recommendations and follow manufacturer label directions. Plateau® herbicide can be used to control grasses, including johnsongrass and shatter cane. **NOTE:** Switchgrass stands may be damaged by Plateau®.

Weeds are usually controlled by clipping with a sickle bar mower set at a height where only the leaf tips of the warm season grass seedlings are cut, and the growing point is not damaged. This will

reduce the shading competition and will not hurt the emerging seedlings. Mowing weeds before flowering will prevent seed production. Mowing 2-3 times may be necessary during the establishment year. However, if clipped too frequently, weeds may “stool out” (grow out instead of up).

Fertilization

On fertile cropland, weeds and CSG will likely establish faster than WSG. Warm-season grasses do benefit from reduced weed competition on less fertile sites.

Do not lime if pH is 6.0 or higher for forage production, or 5.0 or higher for conservation cover. **NOTE:** Do not apply any fertilizer before planting or at planting. If soil test recommendations do prescribe fertilizer application, apply during the second growing season following germination.

Recommended Varieties (In order of preference)

Switchgrass
Shelter (For conservation cover)
Cave-in-Rock (For forage)

Big bluestem	Little bluestem
Niagara	Aldous
Rountree	Camper

Indiangrass
Rumsey
NE-54

Varieties should only be bought as certified seed. This provides assurance of high standards for seed quality: identity, purity, germination, and weed seed content.

Rates

Warm-season grasses may be sown individually or in mixtures for either forage production or conservation cover. Legumes or wildflowers may be added for conservation cover. However, the addition of legumes or wildflowers may eliminate the use of broadleaf herbicides for weed control, except Plateau®.

Warm-season grass seeds usually have lower germination rates than CSG. Therefore, it is absolutely essential when purchasing and planting WSG that the quantities of seed be based on Pure Live Seed (PLS). The following seeding

recommendations are for PLS, not bulk pounds per acre.

Seeded alone:

Switchgrass	10 lbs. PLS/ac. drilled
	12 lbs. PLS/ac. broadcast

Big bluestem, little bluestem or indiangrass	
	12 lbs. PLS/ac. drilled
	14 lbs. PLS/ac. broadcast

Recommended Grass Mixture, Drilled:

Big bluestem	4 lbs. PLS/ac.
Little bluestem	2 lbs. PLS/ac.
Indiangrass	2 lbs. PLS/ac.

Legumes or Wildflowers: (does not affect grass seeding rates)

Illinois Bundleflower	1 lb./ac.
Partridge Pea*	1 lb./ac.
White clover	1 lb./ac.

*Use the Platte variety if seeding north of Blue Mountain

Planting

Seeding dates:

Southern PA – December 1 to April 15
Northern PA – November 15 to May 1

Except for switchgrass, WSG seeds (bluestems and indiangrass) have fluffy appendages (awns or “beards”) that prevent them from flowing through standard drills. Even when the seeds are “de-bearded,” modifications to standard drills may be required to sow them.

Some WSG require a freeze/thaw cycle to break dormancy. Unless seeded early in the spring (when alfalfa is normally seeded), most of the dormant seed will not germinate until the following year. Seedlings that do germinate late in the spring will also be more susceptible to a summer drought because the seedlings will be much smaller. When ordering seed, dormancy percent (hard seed) should be taken into consideration.

Planting WSG after the last frost may result in low germination the first growing season. However, weed control must continue through the first growing season in order to provide less weed competition during the second growing season when more germination will occur.

Seed can be purchased “pre-chilled,” but it is not always readily available. Also, pre-chilled seed may be shipped wet or moist, and unless handled properly it may germinate in storage/shipping. The preferred method of seeding WSG is with a no-till drill. Sowing WSG in tilled seedbeds with a suitable drill is acceptable. Warm-season grasses may also be broadcast and culti-packed into tilled seedbeds. However, broadcasting poses the most risks for successful establishment.

When using a drill in recently tilled seedbeds, it is best to culti-pack the tilled soil before seeding. Whether drilling or broadcasting on tilled soil, it is essential to culti-pack after seeding. It is further recommended to culti-pack twice after broadcasting, with the second culti-packing 90° to the first.

Seeding depths:

Switchgrass 1/8 - 1/4 in.

Big bluestem, little bluestem or indiangrass
1/4 – 1/2 in.

MANAGEMENT

With favorable weather, WSG have the potential to reach 4 to 5 feet growth in the establishment year. However, it usually takes two years for a new stand to reach maximum growth due to slow germination and seedling development. Evaluate the stand at the end of each growing season. When there are 1 to 3 seedlings per square foot, the stand should be adequate for most uses.

There are multiple uses and benefits of WSG. The three primary uses are hay, grazing and conservation cover. The management of WSG differs somewhat according to its intended use. Management for each intended use will be discussed separately; however, there are some general management principals that apply to all uses.

There are secondary benefits of WSG for wildlife and these benefits vary based on the primary use. In a grazing program, WSG provide spring ground nesting habitat. In a hay program, they provide spring ground nesting habitat and, if only one cutting is made, they provide winter cover. As conservation cover, they provide both spring ground nesting habitat and winter cover.

General Management

Maintain field soil conditions so that moderate phosphorous and potassium levels are achieved according to soil test results. Keep the soil pH levels at 5.0 for conservation cover. For forage production, whether for hay or grazing, a pH of 6.0 should be maintained. For maximum forage production, apply 40 to 80 pounds of nitrogen per acre in split applications, but only after successful establishment (may be first or second year after planting). Apply the first application in May when growth is less than 8 inches and the second half in mid-summer after the first harvest. In the absence of a soil test, apply phosphorus and potassium based on a 100-bushel/acre corn yield. A rate of 20 pounds of nitrogen per acre may be used for conservation cover, but is not necessary. By maintaining a healthy, vigorous stand of WSG, you minimize the possibility of broadleaf weed or woody invasion problems.

Grazing Management

Do not harvest the stand the first year of establishment. During the establishment year, make an assessment 4 to 6 weeks after planting to determine if weed control is necessary.

If weed control is needed, there are several methods that can be used. The easiest and cheapest way is to clip the stand with a sickle bar mower to a height where only the leaf tips are cut and the growing point is not damaged. This will reduce the shading and will not hurt the emerging seedlings. Broadleaf weeds can be controlled with the use of 2,4-D or dicamba once the WSG seedlings have 4 leaves (or when they are 6 inches tall). The herbicide Plateau® can be used to control annual and perennial grasses, or broadleaf weeds and vine species. Plateau® is recommended for new seedlings and established stands of most warm season grass species with the exception of switchgrass. Follow the manufacturers label directions and recommended uses of their product in addition to Penn State Agronomy Guide recommendations. Grazing is not a preferred way to control weeds in the first year as over-grazing, hoof damage and up-rooting could substantially damage the stand.

Weed control in subsequent years, after the establishment year, can utilize the same techniques as listed above. Grazing in early spring can also be used to control CSG. Heavy grazing pressure early in the season before WSG start to grow (generally May 1) can significantly weaken the CSG in the stand and allow the WSG a chance to better compete and survive. Cool-season grasses

can also be controlled by applying paraquat or Roundup® when the WSG are dormant in the spring or fall by following the Penn State Agronomy Guide recommendations and manufacturer label directions.

Sheep and goats may be used to selectively graze broadleaf weeds early in the season. Properly trained individuals can also use prescribed burning to control weeds in a WSG stand. However, all local burning ordinances and laws must be followed. Consider the effects on nesting wildlife when doing any weed control.

The stand can be grazed beginning the first summer following successful establishment. Graze the stand when the height of the plants reaches 10 to 14 inches. Leave a stubble of 6 to 8 inches for rapid re-growth. Withhold grazing starting 35 days before the first expected frost to achieve strong re-growth. The plants can be grazed to a 4 to 6-inch stubble after frost without damage, but forage quality will be low. When grazing WSG, use a short-duration (12 to 24 hour), intensive rotational grazing system to minimize trampling and maximize effective utilization.

Warm-season grasses are best suited for use in a grazing program with beef animals, in particular with cow-calf or stocker operations. Sheep and goats will also utilize them, but on a limited basis. They are of limited use for grazing with lactating dairy cows. However, they may be used for dry cows or heifers.

Hay Management

Use the same weed control techniques (except grazing) as stated above. Harvest for hay when the plants are reaching late boot stage. Cut to a stubble height of 6 inches. If a second hay cutting is made, allow for 35 days of WSG re-growth before the first frost. If a second cutting is not taken, wildlife will benefit from the winter cover the additional growth will provide.

Conservation Cover Management

When managed properly this primary use can provide the maximum wildlife benefits. Weed control during the establishment year is essential to insure the survival of the stand.

Clipping or herbicide treatment are the two accepted methods of control. Use the same procedures as listed above under grazing management.

The WSG growth can be utilized as a hay crop, eliminating the accumulation of excess old growth and helping control any woody plant invasion. Harvesting must be done between July 16th and August 15th, leaving a minimum 6-inch stubble. Ground nesting wildlife will benefit from undisturbed nesting cover in the spring and re-growth will provide sufficient winter cover. Maximum benefits of haying are realized if hay is harvested at least every other year. Haying and grazing are not permitted in the Conservation Reserve Program (CRP) or Conservation Reserve Enhanced Program (CREP) but are allowed in the Wildlife Habitat Incentive Program (WHIP).

The use of fire is an excellent management tool for weed control and boosting stand vigor. The use of fire as a management practice should be done in the third year after successful establishment when the plants have 1 to 4-inches of new growth. Burning every other year thereafter is sound management to ensure stand vigor and good seed production. Fire management needs to be conducted by properly trained individuals following a prescribed burn plan developed by a qualified specialist. All local burning ordinances and laws must be followed. Burning on CRP/CREP WSG acres in Pennsylvania may be carried out only once during the 5th to 7th years of the 10-year contract.

SUMMARY

With proper establishment techniques and management, WSG will provide forages for grazing livestock through those summer slump months when CSG go dormant or slow their growth tremendously. WSG can also provide excellent wildlife habitat. The extra effort required to establish WSG is offset by the benefit of longevity the stand provides.

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